TOWARD A SAFER FUTURE

National Transportation Safety Board Priorities

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How safe is the U.S. transportation system, and where should attention be focused to make the system safer for the future? Such questions are often posed to the National Transportation Safety Board, an agency whose primary role is to conduct independent investigations of transportation accidents, to determine their probable cause(s), and to make recommendations aimed at promoting transportation safety. During the past 30 years, transportation accident rates have been dropping, while the capacity and usage of the system have remained steady or grown in every mode of transportation. Nevertheless, the serious consequences of transportation accidents make a compelling case for continued vigilance in pursuing improvements in all aspects—technical, operational, and human factors—of the transportation system.

NTSB believes that continued population growth will be associated with increases in transportation congestion and exposure rates, resulting in higher numbers of accidents, even if the accident rate drops slightly. For example, according to research conducted by the Federal Aviation Administration, the International Civil Aviation Organization, and the Boeing Corporation, civil aviation is expected to grow approximately 4–6 percent per year in the United States, with even higher growth projected for overseas. If current airline accident rates are maintained, the total number of major accidents will increase; the result will be the possibility of such an accident somewhere in the world each week. The data available to NTSB suggest strongly that unless transportation accident rates are significantly reduced, accidents involving loss of life and serious economic impact will place a heavy burden on public and private organizations tasked with safety improvements in all transportation modes.

The greatest human cost of transportation accidents is, of course, the lives lost, and the largest proportion of these losses is due to highway crashes. In 1997 highway crashes resulted in about 42,000 lives lost; nearly 3.4 million injuries; and a conservative estimate of approximately $150 billion in medical costs, lost productivity, and property damage—or $410 million per day (*1*).

The economic cost of accidents to society is very high. According to the FAA, the direct cost of just one fatal aviation accident in Sioux City, Iowa, beyond the tragic loss of life, was more than $300 million. The direct cost of the recent catastrophic accident involving TWA flight 800 near East Moriches, New York, will be much greater; the cost of the NTSB investigation alone is more than $30 million and still climbing. Likewise, large oil pollution accidents involving massive oil tankers such as the *Exxon Valdez* incur cleanup costs of $2–3 billion.

Each accident, large or small, fatal or nonfatal, provides lessons to be learned. Learning these lessons and implementing safety improvements to prevent similar accidents, while often frustrating and difficult, is the primary focus of the efforts of NTSB.

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Key Areas for Safety Improvements

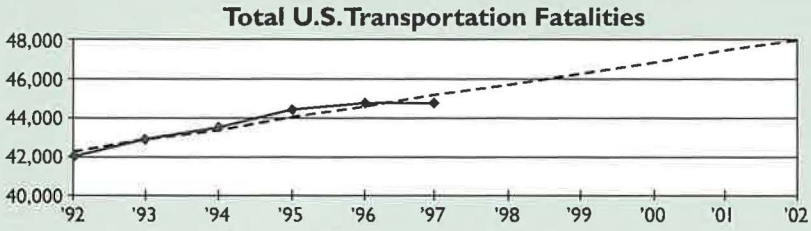
NTSB has recommended 10 key areas as priorities for efforts to improve transportation safety. The agency views these areas as the foundation for future public policy action in the various transportation modes.

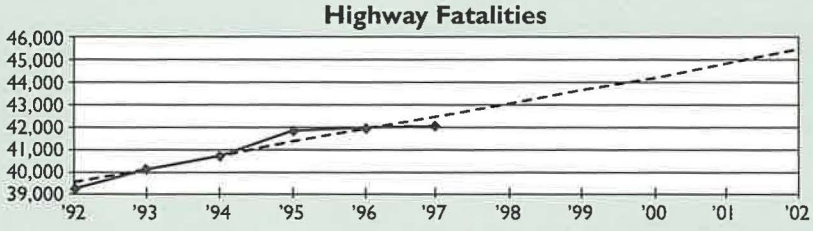
Highway

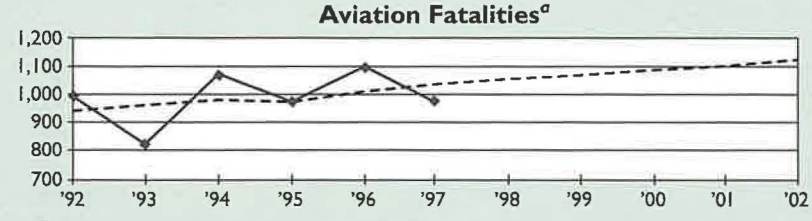
NTSB has identified two issues in highway safety for priority attention. The first addresses protection of highway vehicle occupants and encompasses a series of recommendations on the design, installation, and usage of seat belts and child restraints. The second issue is focused on reducing the high numbers of fatalities among youthful operators involved in highway crashes.

The National Highway Traffic Safety Administration reports that an increase in the seat belt usage rate from the current range among the states of 62–79 percent to 85 percent would result in more than 5,300 lives saved annually (*1*). NTSB has recommended that states enact legislation for

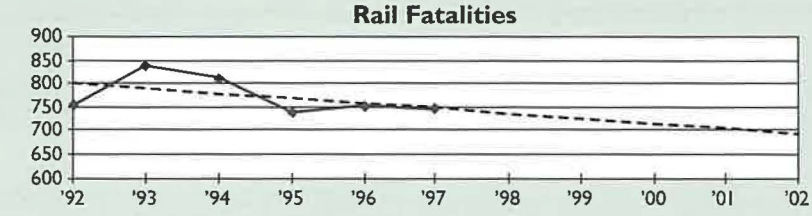
Transportation Fatalities

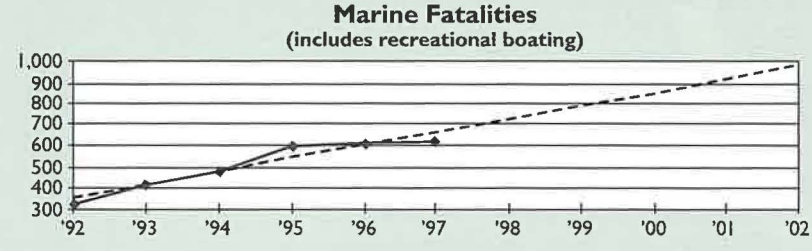


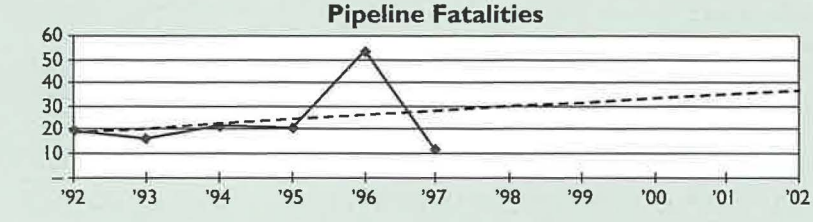




[a] Includes general aviation.







Source: 1992–1997 NTSB U.S. Transportation Fatalities Statistics (1998–2002 based on linear projections)

mandatory seat belt use and for primary enforcement (allowing state enforcement officers to stop a motor vehicle driver solely for a seat belt violation). To date, all states but New Hampshire have mandated seat belt use, yet just 14 of these states, plus the District of Columbia and Puerto Rico, have provisions for primary enforcement (*1*). NTSB continues to emphasize the need for such provisions because available data indicate that states with primary enforcement have seat belt usage rates 15 percent higher than those of other states. The agency would like to see all states enact primary enforcement laws, including provisions for driver's license penalty points and appropriate fines.

Investigations conducted by NTSB also have revealed serious safety deficiencies in the design and installation of child restraint systems. Moreover, the back seat of many vehicles does not allow for the safe transport of children. The agency therefore recommended to all automobile manufacturers that they offer integrated restraint systems in their passenger vehicles. Such systems are built into the vehicle as an anchor for approved child safety seats. Integrated restraints provide four safety benefits: they obviate the need for supplemental hardware; eliminate restraint system availability problems; encourage use of the back seat, where the integrated restraints are installed; and provide restraints specifically designed for children. NTSB also wants to see lap/shoulder belts for center rear seats.

The second broad highway safety issue is reducing the number of deaths among youthful operators involved in highway crashes. NTSB has recommended a series of actions by the states aimed at achieving this goal. These recommendations include continued action to toughen and enforce minimum drinking and driving laws, the enactment of laws mandating a provisional licensing system, and nighttime restrictions for young novice drivers. The value of the agency's recommendation to the states that they prohibit alcohol sales to or purchase by persons under age 21 is reflected in estimates by NHTSA that more than 17,300 lives have been saved because all 50 states have enacted such prohibitions (*1*). Notwithstanding the success of this legislation, NTSB continues to believe that the states should aggressively pursue graduated licensing laws and nighttime restrictions.

Aviation

Three distinct issues must be addressed if major gains are to be made in aviation safety:

- Airframe structural icing
- Airport runway incursions
- Explosive mixtures in fuel tanks on transport category aircraft

The hazard of airframe structural icing was identified by NTSB as a major safety concern 17 years ago. No formal action was taken on the agency's recommendations for addressing this concern. After two more aircraft losses in 1994 and 1997, this safety issue became an NTSB priority. The agency continues to seek a revision of federal aircraft icing regulations based on the latest findings on icing weather conditions. Also being emphasized is the need for research aimed at developing a new on-board system to detect and protect aircraft against freezing drizzle.

Airport runway incursions remain a primary concern. Both the number and rate of runway incursions have shown a significant 4-year increase of 72 percent (2). After a number of runway collisions involving aircraft at airport locations including Atlanta, Detroit, Los Angeles, and St. Louis, NTSB began emphasizing the importance of safer control of aircraft on the ground. Specifically, the agency is emphasizing the importance of avoiding delay in the installation of devices aimed at preventing these accidents, such as the Airport Surface Detection Equipment III radar and the Airport Movement Area Safety System.

In May 1997 NTSB began focusing on the need to preclude the operation of transport category aircraft with explosive fuel-air mixtures in their fuel tanks. This safety issue emerged as a priority as a result of the agency's ongoing investigation of the TWA flight 800 crash. To address this issue, consideration must be given to such aircraft design modifications as nitrogen-inerting systems and the addition of insulation between heat-generating equipment and fuel tanks for both newly certificated and existing aircraft.

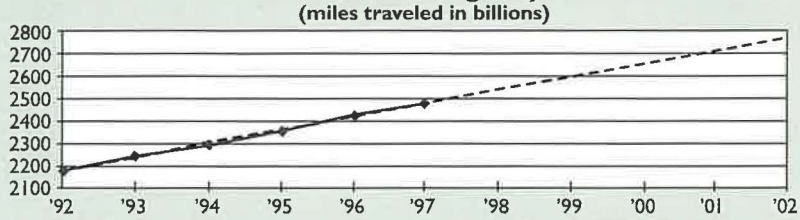
Railroad

The highest-priority issue in railroad safety is positive train separation. Many major collisions between trains could have been avoided with a system designed to mandate train separation. The approximately 200 train collisions that occur each year are often the result of human error involving failure to obey signal systems, operation at excessive speed, or incapacitation. Advanced control systems can provide a safety net for such failures of human performance in the operation of trains.

Promulgation of federal standards requiring the installation and operation of a train control system on mainline tracks to provide for positive train separation has been an NTSB recommendation for the past 11 years. Various railroad operators have initiated research projects and demonstrations to display the value of such systems. However, the agency believes a clear set of federal implementing directives is essential.

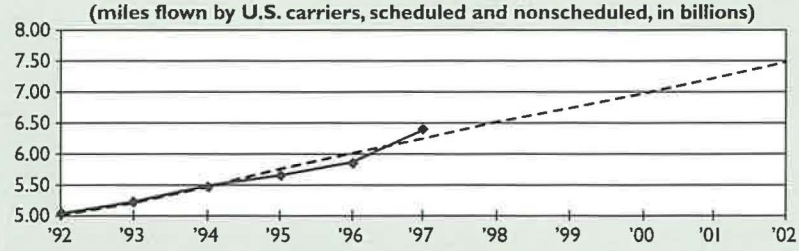
Growth in Transportation

Growth in Highway
(miles traveled in billions)



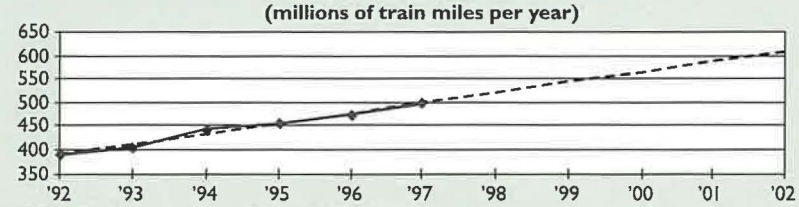
Source: Federal Highway Administration (based on traffic counts in each state) (1998–2002 based on linear projections)

Growth in Aviation
(miles flown by U.S. carriers, scheduled and nonscheduled, in billions)



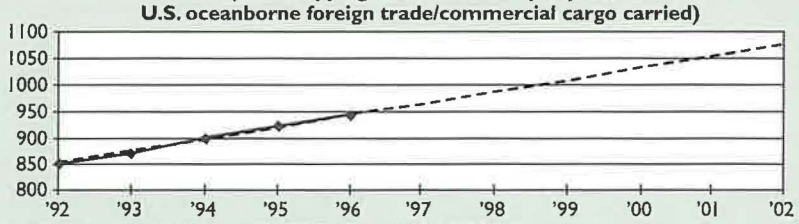
Source: NTSB Aviation Accident Database (www.ntsb.gov) (1998–2002 based on linear projections)

Growth in Railroad
(millions of train miles per year)



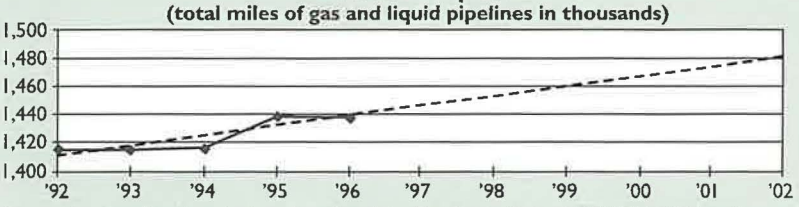
Source: American Association of Railroads (1998–2002 based on linear projections)

Growth in Marine
(total shipping tons in millions per year, U.S. oceanborne foreign trade/commercial cargo carried)

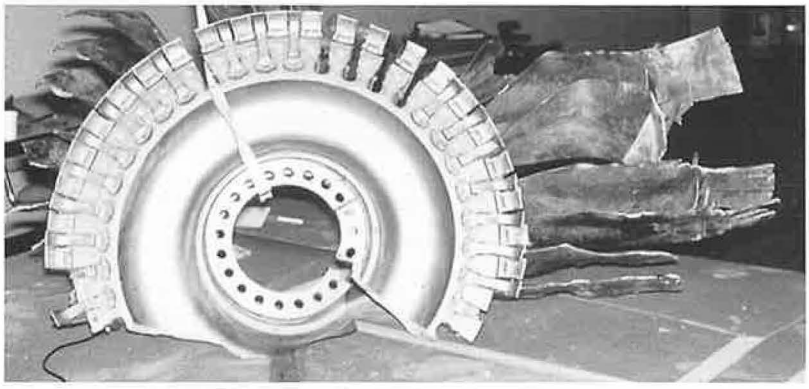


Source: Maritime Administration, U.S. DOT, August 1997 (1997–2002 based on linear projections)

Growth in Pipeline
(total miles of gas and liquid pipelines in thousands)



Source: American Petroleum Institute Basic Petroleum Data Book, August 1997 (1997–2002 based on linear projections)



Damaged parts from DC-10 aviation accident, Sioux City, Iowa, July 1989. If current airline accident rates are sustained, the total number of major accidents will increase.

Marine

The greatest loss of life in the marine mode occurs in recreational boating. In its 1993 recreational boating study, NTSB recommended that the states consider implementing a minimum boating safety program that would include mandatory use of personal flotation devices by children, a required demonstration of operator knowledge of safe boating rules and skills, and operator licensing (3). In 1998 this recommendation was reiterated after further study of personal watercraft safety (4). To date, 22 states have introduced legislation addressing the needed safety improvements or strengthening existing laws. Since the agency's 1993 study, 26 states have taken action to improve their recreational boating safety programs. Continuing emphasis is needed until a minimum boating safety program has been implemented by all states.

Pipeline

The major emphasis in the pipeline mode is on improved prevention programs to reduce excavation damage to underground facilities. One of the primary improvements needed is the use of excess flow valves to minimize the consequences of major gas leaks on service lines. In 1981 NTSB recommended that the U.S. Department of Transportation require these valves in single-family, high-pressure gas service lines that were either newly installed or renewed. Although action has not been taken on this recommendation, several progressive operators of gas distribution systems have established practices consistent with the recommended action. And in 1994 NTSB issued a recommendation to the states that they require the installation of excess flow valves on all new or renewed gas service lines.

Intermodal

Some safety issues cut across all modes of transportation and require action that must be coordinated by U.S. DOT and the various modal administrations. Two such issues warrant high priority: human fatigue in transportation and automatic information-recording devices.

In investigating numerous accidents in all transportation modes, NTSB has identified serious and continuing problems concerning the far-reaching effects of fatigue, sleepiness, sleep disorders, and circadian factors on transportation system safety. There is a general lack of training for both employees and management on the problems associated with work and rest schedules. Constantly shifting work schedules also adversely affect safety and performance.

Human fatigue has been a causal or contributory factor in aviation, highway, marine, and railroad accidents. In 1989 NTSB issued three safety recommendations to the U.S. Secretary of Transportation calling for a coordinated and aggressive federal program addressing all facets of fatigue in the transportation industry. To date, substantial research has been conducted by U.S. DOT, but the regulatory changes needed to address effectively the issue of human fatigue in transportation operations have not taken place.

Automatic information-recording devices are needed on all types of commercial vehicles. Such devices capture a broad range of data, such as vehicle speed over ground, compass headings, operator voice, radar data, wind speed, temperature, and fire alarms. These devices not only provide information useful in explaining accidents, but also can be used to detect unsafe trends or improper procedures so they can be corrected before accidents occur. Several U.S. DOT agencies are currently considering actions related to automatic information-recording devices.

Conclusion

Transportation accident rates have been declining as transportation economic indicators have been growing, and fatality levels have remained fairly steady. NTSB does not view these trends as signs of success, but believes the goal must be to achieve declining fatality levels in every mode of transportation every year. The improvements described here represent an effective blueprint for achieving a major reduction in transportation fatalities.

References

1. *Traffic Safety Facts 1997*. NHTSA, U.S. Department of Transportation, Washington, D.C., 1998.
2. *Aviation System Indicators*. FAA, U.S. Department of Transportation, Washington, D.C., 1998.
3. *NTSB Safety Study: Recreational Boating Safety*. NTSB/SS-93/01, National Transportation Safety Board, Washington, D.C., 1993.
4. *NTSB Safety Study: Personal Watercraft Safety*. NTSB/SS-98/01, National Transportation Safety Board, Washington, D.C., 1998.